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There are thirty-four chapters as follows: "Methods Used in the Reduction and Discussion of the Results of Physical Measurements;" "Measurements of Length;" "Weighing;" "Density;" "Elasticity of Solids;" "The Pendulum—Measurement of 'g' and Rating of a Chronometer;" "Surface Tension and Viscosity;" "The Barometer;" "Thermometry;" "Expansion of Solids and Liquids;" "Thermal Expansion of Gases;" "Calorimetry;" "Calorimetry—Latent Heat;" "Vapor Pressure;" "Vapor Density—Freezing and Boiling Points of Solutions;" "Melting Point—Ratio of Specific Heats—Conductivity;" "Sound;" "Refractive Index;" "Dispersion and Wave-Length Measurements;" "Interference;" "Lenses and Mirrors;" "Polarized Light;" "Photometry and Color Vision;" "Measurement of the Earth's Magnetic Field;" "Adjustment and Use of Galvanometers;" "Measurement of Resistance;" "The Resistance of Electrolytes;" "Measurement of Electromotive Force;" "Resistance Thermometers and Thermo-Junctions;" "Measurement of Current;" "The Ballistic Galvanometer and Measurement of Capacity;" "Measurement of Self- and Mutual Induction;" "Permeability;" "The Quadrant Electrometer."

The appendix is valuable, giving directions for simple glass-blowing, making quartz fibers, silvering mirrors, etc., and containing a series of twenty-eight tables of constants.

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Mathematical Geography. By WILLIS E. JOHNSON. New York: American Book Co., 1907. Pp. 336. \$1.00.

The author has tried to gather "subject-matter . . . scattered [*sic*] about in many works." The reviewer, after carefully reading the whole book and testing parts of it, is glad to record his belief that the attempt is a success and that teachers will find here an intelligible account of the main mathematico geographic features of the earth, as far as they admit of simple explanations. It will be very useful to those for whom it was written.

The topics treated are: the earth's form, rotation, and revolution; latitude, longitude, time, calendar, seasons, tides, map-projections, surveys, and the earth in space. The language is for the most part clear enough, if we remember that such a work is not likely to be taken up by the casual reader or anyone who is unwilling to give it close study. Map-projections are among the most troublesome parts of mathematical geography and the treatment here given will enable anyone actually to construct all the usual ones if he be persistent. The beginner will find some difficulties that might have been avoided by a little more attention to his state of mind, as for instance in such a simple matter as finding by trial the center from which to describe a circle that shall pass through three given points. Theoretically anyone who has "had" geometry can do it at once. Practically a hint or two comes like water in a thirsty land. The figures, too, would be more helpful if they were drawn according to the prescriptions of the text. Probably the publishers are to blame for such figures as 65 and 67, where the spacing of parallels is obviously *not* what the construction requires. So too of 69, 70, 71, and 72, with others. They are purely impression-

istic, giving the general effect. They are good enough for anyone who understands the matter, but not good enough for the student who is trying to master it. But for this minor defect, for which the capable teacher will duly apologize the account of projections is a good one.

It is hard to see why McNair's experiment with falling bodies is described, as it led to nothing. The statement quoted on p. 101, "A party of missionaries bound from China, sailing west, and nearing the [date] line, etc." evidently needs correction, but slips are very rare. The chapter and appendix on the tides are a blemish in the book. They are not needed and could be very well omitted. On pp. 184 and 185 it is asserted—not in these words—that centrifugal forces in the earth developed by its revolution about a common center with the sun [or moon], are less on the side next the sun [or moon] than on the opposite side. It is one of many illustrations of the acute mind of W. M. Davis that he was first to perceive the fundamental importance of the opposite view, as he has explained in Appendix J of his *Physical Geography* (1898), and G. H. Darwin in *The Tides* (1898), p. 98. For the beginner Darwin's introduction of the arrow held parallel to itself while carried about a center is the final touch by which genius lights up darkness. Whoever is interested enough to refer to these authors will perceive that centrifugal forces are to be regarded as equal for all parts of the earth. Rigidly carried out, Professor Johnson's thought seems to give twice as great a tide-raising force on the side of the earth away from the moon as on the one next it, which is not the fact of observation.

The Whewell cotidal chart at p. 186 was discredited by its own author in 1836, as the present reviewer noted in the *National Geographic Magazine* in November, 1898.

If all teachers were competent none of these defects would be serious. As it is too much space has been given to them here. The impression the reviewer would like to convey is that they are the only serious objections that can be found to the work, which is a good one and will be distinctly useful.

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First Principles of Chemistry. By RAYMOND B. BROWNLEE AND OTHERS.
Boston: Allyn & Bacon, 1907. Pp. 419.

There is no dispute among science teachers that the study of chemistry is usually difficult for beginners. The reason for this lies in the fact that a certain amount of work must be done before enough facts and fundamental ideas can be presented to the beginner for him to acquire any perspective. For this reason it is of extreme importance that we should put into the hands of the student a textbook which in the first place is written in an easy style; which in the second place at all times keeps well to the prime object of high-school chemistry, viz., the presentation of chemical laws and ideas and their corroboration by means of experiment and illustration; which in the third place holds and stimulates the interest of the reader and brings out the value and importance of the study by referring to practical applications in everyday and industrial life. The textbook by Brownlee and